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ASTi
Telestra 4 Target
Operation and Maintenance Manual

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Advanced Simulation Technology inc.500A Huntmar Park Drive, Herndon, Virginia, 20170 USA
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Product Name: Telestra 4 Target

ASTi Telestra 4 Target Operation and Maintenance Manual

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ASTi

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Chapter 1: Introduction

The Target is an embedded, real-time platform, providing high-fidelity radio/communications and environmental cue modeling. The Target connects to ASTi's flexible, networked-based ACENet architecture which provides a wide range of high-fidelity, scalable, digital 48kHz audio and I/O peripherals. With real-time performance and reliability, the Target uses the latest multi-core processing technology. The Target supports a variety of additional software services and packages to meet even the highest of communications simulation requirements.

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1.1. Theory of Operation

1 The Telestra 4 (also called a Target) is an embedded server that processes audio and communications (Number 1 in Figure 1, below). The Target runs the Red Hat® Enterprise Linux® operating system as well as a suite of custom software applications written and maintained by ASTi.

2 Audio is processed in remote units called ACE-RIUs, ACUs, or ACU2s. Headsets, PTTs, speakers, or microphones are plugged into these devices. The audio is sent digitally over ACENet (Number 2 in Figure 1, below) to and from the Target. Crown Amplifiers can also be connected to the ACENet and process audio from the Target. The ACENet runs over ethernet, but is different from a typical LAN between computers. ACENet should be isolated from any other network, and each remote unit receives a name instead of an IP address. Reference the ASTi ACENet Guide for more information.

3 The Target runs a custom Project that processes the audio and simulates radios, intercom systems, or sounds such as airplane engines or the rotors of a helicopter. The custom project is a software load that makes the Target customized to a particular application such as a flight simulator. Often a host computer is responsible for sending commands to the project (Number 3 in Figure 1, below). In most cases, UDP packets are sent back and forth between the Target and the host. These commands can control how audio is routed, how radios behave, or how the sound effects are processed.

4 The primary tool for maintenance and troubleshooting tasks is called Remote Management Service (RMS) (Number 4 in Figure 1, below). RMS is a web server that runs on the Target and can be accessed by any computer on the same network as the Target. Simply point a web browser at the IP address of the Target to access RMS. The health system, ACENet statistics, and the custom project are all managed and accessed in RMS.

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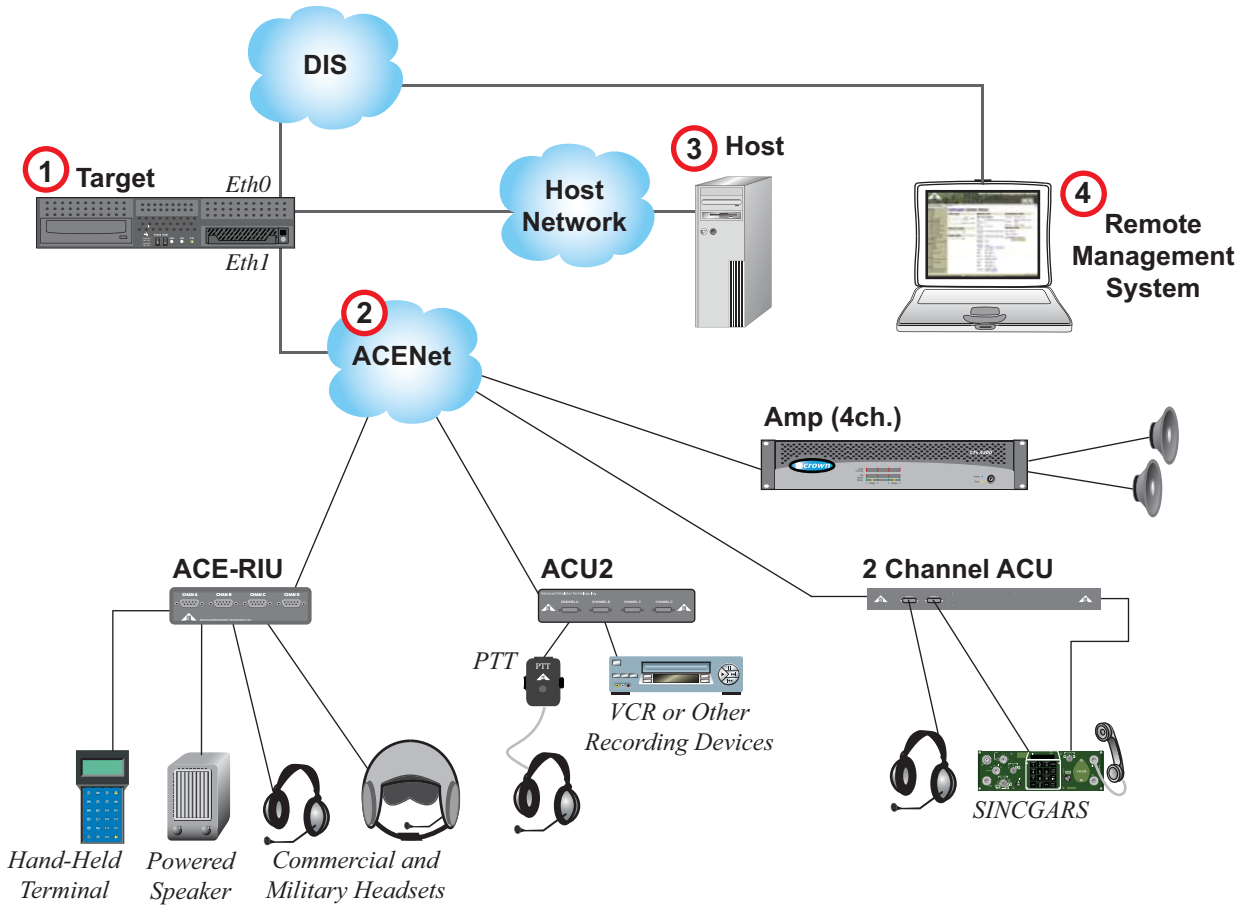

Figure 1: Theory of Operation

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Chapter 2: System Description

2.1. Target Hardware Components

The Target consists of a number of hardware components and can be configured in many different ways depending on the requirements of the particular application. The components are discussed in more detail in the following sections. Engineering drawings supplied with each Target identify the overall system configuration.

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2.1.1. Chassis

The standard Target is currently a 2U, 19” rackmount system.

Target	Depth	Width	Height	Weight
Standard 2U	22 3/4”	17”	3 1/2”	31 lbs. (as shipped)
With Front Rackmount	24”	19” (with thumb screws)	3 1/2”	
With Middle Rackmount	22 3/4”	19”	3 1/2”	

Table 1: Telestra 4 Target Chassis Dimensions

Figure 2: Telestra 4 Target Chassis

A 1U Target option is also available.

Target	Depth	Width	Height	Weight
1U Option	25 1/2”	19”	1 3/4”	24.5 lbs. (approx.)

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2.1.2. Power Supply

The power supply is a standard 2U 400 watt or greater power supply. It is auto-sensing and accepts 100-240 Volts with 47 to 63Hz. The input power of the device is 100-240 VAC, 8A-4A, 47-67 Hz.

2.1.3. CPU Type

The CPU type used in the system depends on the time of purchase and whether any CPU upgrades have been incorporated. The typical CPU is an Intel® multi-core processor.

2.1.4. Hard Drive

The Target hard drive is a Serial ATA removable drive; the size may vary depending on the system configuration. The platform will include a removable drive docking bay as part of the chassis. The bay will accommodate a 3.5” removable drive cartridge.

2.1.5. Optical Drive

The Target has a Serial ATA DVD/CD drive. This drive is used for installing system software.

2.1.6. Keyboard and Monitor

The 101-key keyboard is supported via a standard PS/2 connector on the rear of the chassis.

The video connection is via a 15-pin, female, high-density, sub-miniature, “D” style connector located on the back of the chassis.

2.1.7. Network Ports

Ethernet operation conforms to IEEE 802.3. UDP level protocol with IP addressing supported along with some multicast capabilities.

The following sections discuss the individual network features in more detail.

Host Simulation: Simulation state and sound model control parameters generated by a simulation application on another network computer can be transmitted to the Target.

Parameters include state data such as engine RPM, radio frequency, communications panel switch settings, radio position, exercise number, etc. These parameters are brought into the local audio models using special input control objects found in the modeling environment.

In addition to reception, model information and equipment health status can also be passed from the Target back to another computer through the same link.

The Target can receive information from other computers on the network by specifying different UDP port numbers for data originating from the different machines.

Status and monitor screens are provided in the Remote Management System enabling the user to monitor network activity and examine data received or transmitted by the Target. Network configuration parameters such as port numbers, source and destination IP addresses, etc. are set by the user in RMS.

DIS: When configured for DIS operation the Target connects directly to the DIS network. Signal and Transmitter PDUs are transmitted and received directly, off-loading the host or other network device from dealing with these processor-intensive PDUs.

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Status and monitor screens are provided in RMS enabling the user to monitor network activity and DIS radio traffic. DIS options and network parameters are set via RMS.

ASTiNet: The ASTiNet is part of the Telestra 4 family network.

ACENet: The Audio Communications Environment Network (ACENet) is part of the Telestra 4 family and provides low latency, network-based audio and I/O distribution architecture for ASTi's communications and sound modeling equipment and software. This flexible architecture provides highly scalable distribution network of model processing systems and remote audio and I/O interface devices to address widely distributed and complex multi-user sound and communications applications. For more information on the ACENet, reference the Telestra 4 ACENet User Guide (DOC-01-TEL4-AN-UG-1).

2.1.8. ACENet Devices

The ACENet devices provide remote interfacing of audio and I/O peripherals to ASTi's ACENet architecture. All audio and I/O is digitally distributed between the ACENet devices and Target modeling platforms for maximum noise rejection and reliability. The audio features 48kHz digital distribution and balanced pro-audio style interfaces, providing high-fidelity audio. See the ACENet devices specific technical user guides for more information.

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2.2. Target Software Packages Overview

2.2.1. Operating System Software

Software on the Target system includes an ASTi-configured Linux™ OS and ACE software for the sound and communications model runtime environment. Also included is ASTi's Remote Management System application software providing remote management, configuration and debug of ASTi systems over LAN/WAN from any standard computer with a proper web browser.

2.2.2. Support and Utilities Software

Support and operating system software packages may also be included with the Target. All Target configurations include Linux™ operating system software. Additional support may be installed depending on the Target configuration.

Installation of third party packages by the user is generally discouraged by ASTi. ASTi can not guarantee that user-installed software will not affect the performance or operation of the Target.

2.2.3. Software Licensing

The software included with the Target is ASTi proprietary and subject to the terms of the software license agreement.

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Chapter 3: System Installation

See the Telestra 4 Quick Start Guide (DOC-01-TEL4-QSG-1) for initial Target setup and IP address assignment.

3.1. Receiving and Unpacking

Upon receipt of the Target, check that all packages are received according to the shipping manifest and that no apparent damage has occurred during shipping. Do not accept packages that are obviously damaged without first consulting with the carrying authority.

Unpack and carefully remove the Target components from their shipping packaging in accordance with procedures common to industry standard practices. Be sure to observe all notes, caution or warning labels that may be present on the outside and inside of the shipping packages.

3.2. Parts Inventory

After all equipment is removed from the packaging, verify equipment received against the shipping invoice. Notify ASTi immediately of any discrepancies. All Targets are shipped with engineering drawings that identify the system. Packing lists also provide detailed information about the shipment and may contain important notes.

3.2.1. System Configuration

The current configuration includes a removable hard drive and CD/DVD drive, three or more network ports depending on configuration, and four USB interfaces. No DSP cards are installed or required.

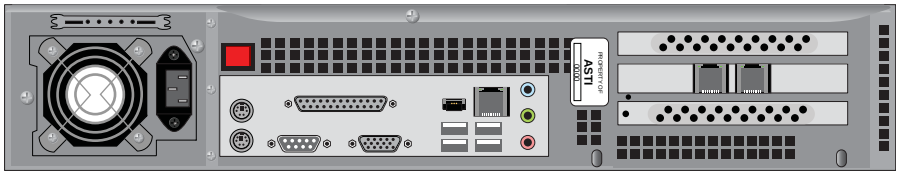

Figure 3: Target Rear Panel

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3.3. Software Installation and Configuration

Targets are shipped with all necessary software pre-installed. To rebuild the system's hard disk, reference the Telestra 4 Target Cold Start Procedure (DOC-02-TEL4-TCS-1). Turn on the Target via the power switch on the front of the chassis. The system will boot into the Linux operating system. For further instruction on Target installation, please see the Telestra 4 Quick Start Guide (DOC-01-TEL4-QSG-1) for initial setup and IP address assignment.

The only user account that exists after system installation or cold start is "admin" (without the quotes). The default password for this user is also "admin." All user account logins and passwords are case-sensitive.

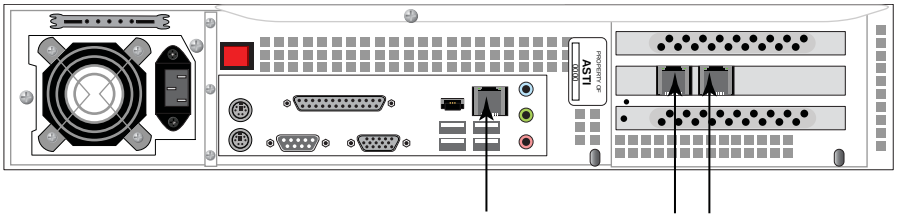
```
Login: admin      Password: admin

Login: root       Password: abcd1234
```

3.3.1. Network Ports

Each Target has three or more Ethernet network ports depending on the system configuration. The physical location and function of each of these connections varies, based on the hardware installed by ASTi prior to shipment. The connections will vary over time and from system to system. ***Please read the ETH labels on your system to verify Ethernet locations.***

The multiple network ports provide convenient, independent connection to a DIS or HLA network, Host simulation network, Diskless, and ACENet. The local or host network is used to pass required data and state parameters back and forth to the user defined sound and communications models on the Target and the customer's simulation software.



Network Ports
See chassis labels for ethernet assignment
Ethernet labels will be ***Eth0, Eth1, and Eth2***

Figure 4: Network Ports

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3.4. Default Network Settings

After initial software installation or system cold start, the Target Ethernet interface ***eth0*** tries to obtain a network IP address and subnet mask using DHCP. To obtain these network settings, a DHCP server must exist on the network intended for use by ***eth0***. If the Target cannot contact a DHCP server using ***eth0***, it will assign a meaningless IP address of 0.0.0.0 to that interface.

The Target's other two Ethernet interfaces, ***eth1*** and ***eth2***, are assigned default IP addresses and subnet masks. Refer to the figure under "Network Ports" for the physical locations of the Ethernet ports.

If you do not wish to use DHCP to configure ***eth0*** (or if the network does not have a DHCP server), the user must manually configure the network configurations including the IP address, subnet mask, and gateway IP. Ask your network administrator for valid IP address and subnet masks for the network(s) where the Target will be integrated.

Note: Manually setting the network configuration requires that a keyboard and monitor be connected directly to the Target.

To manually set the network configuration, log in to the Target as:

```
Login: root   Password: abcd1234
```

Then type the following:

```
ace-net-config -a xxx.xxx.xxx.xxx -n yyy.yyy.yyy.yyy
```

where `xxx.xxx.xxx.xxx` is the IP address and `yyy.yyy.yyy.yyy` is the netmask.

After manually configuring interface ***eth0*** (if not using DHCP), users must use the RMS web interface to change settings for the Target's Ethernet ports. For more information on RMS 4, reference the Telestra 4 Remote Management System 4 User Guide (DOC-01-TEL4-RMS4-UG-4).

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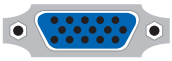
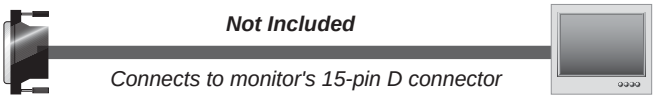
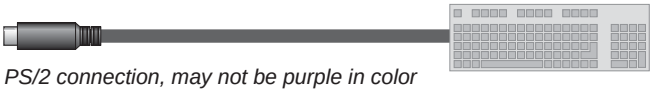
3.5. Connections

After unpacking the Target, connect the power, network, keyboard and monitor cords to the system as described below. Allow two inches of space to the rear of the Target for connections.

Remove all plastic packaging from the Target before proceeding with the system installation.

Note: As technology evolves, the Telestra 4 Target chassis will continue to change. Look for these objects on the **rear** of the chassis, and connect as appropriate.

	Power Cord In	*To chassis* *To wall*
	Main Power Switch	*May not be present on all systems*
	**Video Output**	 ***Not Included*** *Connects to monitor's 15-pin D connector*
	Keyboard	 *PS/2 connection, may not be purple in color*
x3	**Ethernet Jack**	*Each system will have three (3) labeled jacks* *RJ-45 connection* *To network*

Remember to switch on the main power switch on the rear of the Telestra 4 Target chassis.

3.5.1. Connecting ACENet Devices

The ACENet devices connect to the Target through an Ethernet port connection on the rear panel of the chassis.

3.5.2. Power Connection

The power cord attachment and the power switch push-button are both located on the rear panel of the chassis.

3.5.3. Monitor Connection

The monitor can be plugged directly into the Target.

3.5.4. Keyboard Connection

The keyboard connection is a 6-pin mini DIN (PS/2-style) connector on the back of the Target. On all systems, the Target is configured to boot and operate properly with or without the keyboard connected.

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3.5.5. Audio and I/O Equipment Connection

External audio and I/O equipment such as headsets, microphones, amplifiers, preamplifiers, VCR audio in/out, tape players, PTT switches, etc. are connected directly to ACENet audio devices.

3.5.6. Cabling

For minimum noise, individually shielded, twisted pair cable should be used for all audio lines. Shields should be tied at a single point to a good earth ground and in general should not be connected to audio ground.

The most important use of a shielded twisted pair is for the microphone line. Microphone lines usually carry a very small signal and typically run next to the headset line which typically has a much larger, higher current signal. The potential for additional noise and crosstalk is greatly increased if proper cabling techniques are not used.

3.5.7. Software Upgrade

Users must perform a system cold start to upgrade the software. Please see the Telestra 4 Target Cold Start Procedure (DOC-02-TEL4-TCS-1).

Warning: Performing a system cold start to upgrade the software will cause complete erasure of the system hard drive.

Before doing a software upgrade, the user should back up the system. For instructions on backing up the system see the RMS 4 User Guide (DOC-01-TEL4-RMS4-UG-4) section **4.3. Configuration System Backup and Restore**.

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Chapter 4: General Information

This chapter provides general information about the Target.

4.1. Safety Precautions

This section must be read completely and understood before using the Target. The following safety precautions must be observed when performing any operation and maintenance tasks associated with the Target. These safety precautions are necessary to prevent injury to personnel and damage to equipment.

Warning

Potentially fatal voltages are present in the Target. Before removing, handling, or replacing any Target components, ensure that all electrical supplies have been turned off and electrical power cords are disconnected from the Target. There are areas with hazardous energy inside the device. Please, make sure that the device is disconnected from the power source if the cover is removed.

Caution: Risk of explosion if battery is replaced by an incorrect type. Dispose of used batteries according to the instructions.

The following disclaimer is provided regarding use of the Target. The disclaimer applies to all parties using the Target in any situation or configuration. This disclaimer should be read and understood completely before using the Target.

Disclaimer

The Target is a sound production device. The user, by the act of installing and using the Target and any associated equipment such as external amplifiers, headsets, speakers, etc., warrants and represents that he/she is aware that excessive audio levels can cause permanent hearing impairment and that he/she assumes full responsibility for configuring all equipment including hardware and software to achieve safe operating sound pressure levels under all conditions.

4.2. Equipment Handling

All Target circuits and modules are sensitive to electrostatic discharge (ESD). To avoid damage to the Target equipment, proper ESD procedures should be followed when handling all Target equipment. Ensure that all work is performed at a properly grounded ESD work station. In addition, all personnel handling Target equipment should be properly grounded. When the transporting or shipping the Target equipment should be properly grounded.

When transporting or shipping individual modules, equipment should be fully-packaged in an antistatic bag.

ASTi is not responsible for equipment damage due to improper handling.

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4.3. Customer Support

Customer support is a major part of the ASTi audio simulation solution. If you have any questions about our product, how it can be used for your application, or suggestions for future enhancements, you can contact ASTi in the following ways:

By Email - Send an email at any time to support@asti-usa.com.

By Web - Contact us through the ASTi web site at www.asti-usa.com.

By Phone - Call the technical support line 9:00 am to 5:00 pm (Eastern) weekdays at (703) 471-2104,

By Fax - Include your name, company, fax number, phone number where you can be reached, and your specific question. The number for ASTi is (703) 471-2108.

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Chapter 5: HLA Runtime – Joining the Federation

5.1. HLA User Accounts

All user account logins and passwords are case-sensitive. The default HLA user account (hlauser) is created for user convenience.

***WARNING:* ASTi recommends changing the password for the account immediately after software installation or cold start.**

User Account	Username	Default Password	HLA Functionality	Console Login
System Administrator	root	abcd1234	-Federation File Management -Federation Management -Remote Control Interface -RTI Installation -RTI Management	No
HLA Runtime User Account	hlauser	HLA!now!	-Read Configuration Files -Remote Control Interface	Yes

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5.2. The HLA Remote Control Interface

The HLA federate software runs in the background upon system startup and may only be accessed through the remote control interface. The user accesses the remote control interface through a TCP/IP connection to the appropriate control port. Each federate has its own control port as specified in the HLA Configuration section of the ACE Studio Development Workstation Technical User Guide (DOC-01-TELAS-UG-4). A given control port can only support one TCP connection at a time. Once the remote control interface is in place, the user can completely control the system from a remote computer.

Through the remote control interface, a host computer can tell the federate to join or resign from a federation.

The host can also get the following information from the federate:

- Joined/resign status
- Current federate name, federation name, fed file name, rid file name, and conversion file name
- RTI network activity information

The host can only get this information if it is controlling the federate. The commands and responses through this interface are all text based, readable messages. A host emulator program is supplied with the Target and it can act as a console attached to the federate, either on the local or on a remote system. The connection is designed to be robust; if the connection is unexpectedly closed or broken, the socket will automatically re-open and begin listening for a new connection after a time-out period.

Any changes (i.e. Federation Name at Join or Debug Level) made through the HLA Remote Control Interface are temporary changes and are only applicable for the duration of the project install. Upon reinstall of the project/layout any changes will be lost. In the layout, modify the HLA Domain to make permanent changes.

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5.3. Testing the HLA Software

5.3.1. Host Emulation Utility

The host emulation program (`hostemu`) that is shipped with the HLA software allows the user to test the remote interface and verify that it is working correctly. To run the host emulator on the local platform, log in as "`hlauser`."

```
hostemu <port number>
```

To connect to a port on a remote Target, type the command:

```
hostemu <port number> <IP address>
```

where the `<IP address>` parameter specifies the IP address of the remote Target. This command allows a local Target to act as a remote host to a second Target.

Once attached, `hostemu` acts as a console. Typed text is sent to the Target remote control interface, and the replies are displayed on the screen.

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5.4. Remote Control Interface Commands and Responses

The Target federate expects all command lines to be terminated with a newline character ("\n" for those who are C programmers). If two command lines come at once, they will be executed in order. ***A command will not be executed until the final newline (\n) is received.***

Commands are not case-sensitive. However, some data for the commands may be case-sensitive (for example, the fed file name must be in the correct case).

The Target replies are of variable length. This is an indication to the host computer that no additional data will be sent.

If the interface receives a command that it does not recognize, it will simply ignore the new code. If it receives a line of white space (followed by a newline character), it will respond with a newline character.

ACTIVITY

This command returns activity counters from the Target. If accessing the remote control interface through the host emulator utility on the Target, this command may be initiated by simply pressing the <ENTER> key. See the sample output below:

```
life count: 0x41
<Attribute Updates>
 rx: 0x6 | tx: 0xc | ignored: 0x0
<Interactions>
 Audio | rx : 0x0 | tx : 0x0
 TDL | rx : 0x0 | tx : 0x0
 Attach | rx 0x0
<Objects>
 Transmitters | local : 0x2 | rti : 0x1
 Entities | local : 0x0 | attached
: 0x0
ENDLIST
```

The `life count` increments once a second while the entity is joined to a federation. The count is a general indicator of federate health.

`Attribute Updates` report the cumulative number of attribute updates sent and received by the federate. The `ignored` is the number of updates received but ignored. This happens when the federate receives an update for an entity object to which none of its radios are attached. The attributes, which are defined in the ASTi SOM, include radio object parameters such as power, world location, and frequency. An attribute update occurs whenever one of these fields change.

`Interactions` is the number of interactions sent and received. The interaction counters are organized by interaction type. The `Audio` counters increment as the federate sends or receives audio packets. The `TDL` counter increments as the federate sends or receives data messages. The ASTi SOM versions 3.1 and higher define a data message interaction to implement tactical data link simulations in HLA.

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`Objects` lists the number of transmitter and entity objects on the HLA network. For transmitters, the `local` counter reflects the number of local transmitter objects while the `rti` counter reflects the number of remote objects. For entities, the `local` counter reflects the number of entities the federate has detected on the HLA network. The `attached` counter reflects the number of local radios that are attached to existing entities.

`BYE`

This command can be entered at any time to gracefully leave the HLA federate application. If joined, the Target will not resign before exiting.

`DEBUG {value}`

This command can be entered at any time and is used to display or set the current debug level. If the command is entered without a value it will display the current debug level. If entered with a level that debug level will be set.

The debug level parameter determines which combination of debug messages are printed to the file. The value is derived from a debug mask described in the following table.

Remote Control Debug Levels

Level	Debug Mask Position Description
0	Off
1	General (required to print any debug messages)
2	RTI Object Activity
4	New Ethernet Object Info
8	Name Information
16	Ethernet Activity
32	RTI Activity
64	Handle
128	Translate
256	Timeouts
512	Convert
1024	Context

For example, to log “Name Info”, you would set the debug level to 9, which is 8 (Name Info) plus 1 (turn logging on). Setting the debug level to 8 would not work, because it represents 8 (Name Information) plus 0 (logging off).

If you wanted to log “RTI Object Activity”, “New Ethernet Object Info”, “Ethernet Activity”, and “RTI Activity”, but NOT “Name Info”, you would set the debug level to 55 (32 + 16 + 4

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+ 2 + 1). To log every possible message (not recommended), you would set the debug level to 2047 (1024 +512 + 256 + 128 + 64 + 32 + 16 + 8 + 4 + 2 + 1).

Debug messages are printed to the file `/var/log/messages`.

HELP

This command returns a list of all the supported remote control interface commands. The response to this command is:

Commands: `help, join, resign, name, stats, status, activity, bye, quit, debug {value}`

JOIN <Federation Name>

This command directs the Target federate to join the federation with the name specified. If no name is given, it will use the federation name specified for that federate in the Target configuration file. If the federate is joined to a federation, it will resign and attempt to join again. It will do this even if the federation name is unchanged. If a federation name is not set (either through the remote control port or from the configuration file), then the `JOIN` command will fail and respond "`JOIN <NONAMEGIVEN> FAIL`." Two federates must use the same federation name to pass information between them.

The response to the `JOIN` command is either "`JOIN FederationName OK`", "`JOIN FederationName FAIL`", or "`JOIN FederationName FAIL BAD_FED_FILE`". The last response occurs if the federate could not get handles for all of the object class names and attribute names it requested from the RTI. The normal cause of this is that the object names and attribute names in the `.fed` file do not match the information in the conversion file.

If the system does not join successfully, the most likely causes are:

- No `rtiexec` was running
- No federation name was specified
- No license was available to run the RTI (MÄK or VTC RTIs)
- The `.fed` file did not contain the names in the ASTi Radio SOM or was not found.

  If "`JOIN <federation_name> OK`" is returned, the system is running and can be interrogated to determine the federate status and activity.

NAME

When called with no parameters, the NAME command simply returns the names of the federate, the federation, the .fed file, the .rid file, and the conversion file. A typical response to this command is shown here:

```
FEDERATION MySuperFed

FEDERATE Federate1

FEDFILE /tmp/aced-repoKwg3FX/repo/domains/FEDERATE1/hla/
asti3_2.fed
```

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```
RIDFILE /tmp/aced-repoKwg3FX/repo/domains/FEDERATE1/hla/stand-
alone.rid

CONVERT /tmp/aced-repoKwg3FX/repo/domains/FEDERATE1/hla/
convert3_2.conv
```

These variables receive their initial values from the Project domain configuration on project/layout install. After installation these parameters can be modified by passing parameters to the NAME command as shown below:

```
NAME FEDERATION <NewFederationName>

NAME FEDERATE <NewFederateName>

NAME FEDFILE <NewFedFileName>

NAME RIDFILE <NewRidFileName>

NAME CONVERT <NewConvertFileName>
```

Note: The file name parameters must specify the file name only and the file must exist in the hla sub-directory of the currently installed T4 project domain. It is not necessary to enter the full path.

QUIT

This command can be entered at any time to terminate the HLA federate application. If joined, the Target federate will resign before exiting.

RESIGN

This command can be entered at any time in order to leave the current federation. To join a different federation, it is not necessary to resign. Issuing a new `JOIN` command will cause the Target federate to resign from its current federation before attempting to join the new one. If the Target federate is instructed to join a federation it is already joined to, it will resign and re-join that federation. The response is "`RESIGN OK`" or "`RESIGN FAIL`". If the federate is not joined to a federation, no action is taken and the federate will respond "`RESIGN OK`".

STATS

This command prints performance statistics. A sample output is shown here:

```
ScanListTime : n = 94 Min = 0.000013 Max = 0.000122 Avg = 0.000051
TickTime : n = 6058 Min = 0.000008 Max = 0.001606 Avg = 0.000014
```

The `ScanListTime` statistics reflect the number of times the federate software scans the current list of transmitters and receivers, the minimum list scan time, the maximum list scan time, and the average list scan time.

The `TickTime` statistics reflect the number of times the RTI `tick()` function is called, and the minimum, maximum, and average durations of time that are spent within a `tick()` call.

STATUS

This command returns either "`JOINED`", "`RESIGNED`", or "`READY`."

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5.5. RTI EXEC

The HLA software that runs on the Target is an HLA federate. This federate software, when combined with the ACE Studio model processing, implements a full radio simulation environment, based upon the data structures defined in the ASTi Radio SOM.

From power on, an HLA-enabled Target will start the federate application as a background process. A particular federate may be accessed through the remote control interface.

The RTI Software: The DMSO RTI requires that the "`rtiexec`" application is running somewhere on the HLA network. In the normal mode of use, the `rtiexec` will be running on another computer system resident on the HLA network. However, to perform local-only testing or stand-alone tests, it is possible to run the `rtiexec` on the Target. The `rtiexec` will service every system on the network. Prior to starting the `rtiexec`, the DMSO RTI must be installed, and the proper RTI library path must be specified in the RMS HLA configuration section. Once the Target is configured to use the DMSO RTI, log in to the system as "`hlauser`", go to the DMSO RTI directory (in `/opt/rti`) and enter the following commands to start `rtiexec`:

```
cd config
. rtienv.sh
cd ../bin
./rtiexec
```

Although this is not necessary, the MÄK RTI may also use an `rtiexec` application. To run the `rtiexec` application for the MÄK RTI, go the MÄK RTI directory (in `/opt/rti`) and type the following commands:

```
cd bin
./rtiexec
```

To stop the RTI, type `CTRL+C`.

Please refer to the MÄK RTI Reference Manual for more information on the `rtiexec` application. The MÄK RTI requires a license server to run.

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5.5.1. Setting Up the Federation

This section assumes that the RTI and federate software are properly installed on two Targets. This example will use the DMSO RTI (1.3NGv4) and, for the purposes of this scenario, the `rtiexec` process will run on one of the two Targets. Only one `rtiexec` process should exist on the network. For performance reasons, ASTi recommends running this process on a separate machine during an actual exercise and ***NOT*** on one of the Targets.

1. Start the RTI as described above.
2. On each machine, run the host emulator utility from any console.
3. Then enter the command "`join`."

   Wait for the federate software to return "`JOIN OK`" to indicate a successful join operation. If the software returns "`JOIN FAIL`", double check the network configuration on each machine.
4. The `rtiexec` should then indicate successful federate initialization.

At this point, there is an "ASTi" federation with two joined federates. Note that the federate name for each Target was generated based on the hostname and IP address of the individual machine. To properly destroy the federation:

- Resign each federate by typing "`resign`" at the `Telestra >` prompt on both Targets.
- Stop the `rtiexec` process using `CTRL+C`.

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Chapter 6: Security

6.1. Security and Enhancements

The Telestra 4 product suite is built around Red Hat® Enterprise Linux®, providing a communications solution that runs on a fully National Information Assurance Partnership (NIAP) validated operating system. NIAP is a U.S. Government initiative created to meet the security testing needs of both information technology (IT) consumers and producers.

To the end user this means that the entire Telestra 4 product suite including the Target and Studio, runs on an NIAP approved operating system. Couple this with ASTi's Telestra 4 Security Package and you have an NIAP-approved OS that eliminates all CAT I and II issues while locking down the platform in a known working configuration and adhering to the most current security requirements.

Standard Studio and Target security features:

- Red Hat® Enterprise Linux® version 5.x
  - NIAP Approved OS
- Minimal OS Footprint
  - Only essential OS elements are included. For example, the Target platform does not include a desktop environment since it is unnecessary. This aids in eliminating functions or features that increase security risk.
- User ID and Password Authentication
  - This includes the ability to assign unique user ID and passwords to individual accounts.
- Secure Remote Access
  - Access is restricted to essential configuration and management elements required for operation.
  - All remote access is provided through secure means and the plain text remote access capabilities were removed.
  - Due to embedded nature of the Target platform, remote access cannot be completely removed.
- SELinux
  - Security Enhanced Linux (SELinux) provides support for MLS (Multi-Level Security) policies.
- Auditing
  - Tracks activities and modifications of the entire system, including file system operations, process system calls, user actions such as password changes, account additions/deletions/modification, use of authentication services, and configuration changes (such as time changes).

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- Minimize Open Network Ports
  - All unnecessary network ports not vital for Target platform operation are closed.
- BIOS Password Protection
  - BIOS protection includes security features that restrict access to the BIOS Setup program and restrict who can boot the Target.
  - Set a supervisor password and user password for the BIOS setup program and booting the Target.
- Removable Drive
  - Standard configuration of each Target platform provides the ability to remove and secure non-volatile media.
  - Diskless operation options also available.

Telestra 4 Security Package features:

Note: The Telestra 4 Security Package is an optional software package for the Target and Studio.

- Security Hardening Scripts
  - Includes an additional software package for the Target and Studio with ASTi's customized security hardening scripts.
  - Eliminates the majority of CAT I, II, III, and IV issues (see DISA section below).
- ASTi SRR Report
  - Includes a PDF report that documents the current status and actions required by the DAA.
  - Includes High-level summary and detailed sections organized by categories such as Closed, Manual Review, False Positive, Waiver, Open/Future Fix. An ASTi response is provided for all applicable PDIs.

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6.2. DISA & STIGS

The Defense Information Systems Agency (DISA) develops and provides security configuration guidance for IA and IA-enabled IT products. The guidelines are outlined in DISA's Security Technical Implementation Guides (STIGS), which identify existing and potential vulnerabilities on a system. STIGS exist for a variety of operating systems and applications. Additionally, there are Security Readiness Review (SRR) scripts that automate the process of validating a system configuration against the STIG requirements. Every security software version release for the Target and Studio is tested against the latest versions of the UNIX STIG with UNIX SRR scripts.

Within each STIG there are four vulnerability code definitions from category I (high vulnerability) to category IV (low vulnerability).

- **Category I** - Vulnerabilities that allow an attacker immediate access into a machine, allow super user access, or bypass a firewall.
- **Category II** - Vulnerabilities that provide information that have a high potential of giving access to an intruder.
- **Category III** - Vulnerabilities that provide information that potentially could lead to compromise.
- **Category IV** - Vulnerabilities that provide information that will lead to the possibility of degraded security.

ASTi's goal for the Target and Studio is to eliminate all CAT I's and CAT II's and to minimize CAT III and IV vulnerabilities. ASTi has also incorporated the UNIX SRR scripts into the production testing process so that the software is constantly updated with the most valid security enhancements[1].

[1] As the DISA STIG CAT I and II vulnerabilities change in future STIG releases it is impossible to predict future issues. While ASTi will make every reasonable attempt to remove all CAT I and II issues we cannot guarantee removal of all these issues. The CAT I and II issues are constantly changing over time. If removal of an issue is not feasible we will work with the customer to obtain a waiver as required. This will be documented in the accompanying ASTi SRR Report.

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6.3. Customer Responsibilities

The vulnerabilities are given unique labels called Potential Discrepancy Items (PDIs). Each PDI is categorized with a short description of the vulnerability it represents. Out of the hundreds of PDIs, ASTi can eliminate the majority of them; however, the customer is responsible for eliminating several PDIs.

For example, certain elements of the STIGS require that the customer:

- Set non-guessable passwords
- Review audit logs
- Maintain specific physical security requirements

As the STIGS and SRR scripts are updated, the PDI list will change. The specific PDI list is provided for each software release tested against the latest STIG/SRR versions.

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6.4. Telestra 4 Security and Process Details

Certain security features such as secure remote access, SELinux and user accounts are available on both ACE Studio and the Target platform by default. The additional security package is available for installation on the Target and Studio.

The Telestra 4 security software for the Target and Studio is a one-time delivery and when the software is purchased you receive the following:

- Telestra 4 Software Installation DVD(s)
- Telestra 4 Security Software Installation DVD
- ASTi SRR Report(s)
- Updated Options File CD (also called the program software license)

The Telestra 4 security software version for the Target and Studio is based on a STIG version. For example, if you order a security software update in the first quarter of 2008 you will receive the security software version that was run against the November 15th, 2007 DISA UNIX and Web Server SRRs.

Future Telestra 4 security software packages/upgrades that are required to match the latest STIG requirements would require the purchase of a new security package. Future upgrades will be available as required based on customer demand. Additionally, ASTi will provide updates when a STIG update is available. Based on recent history, this means that if required we would release approximately four versions per year. However, this is subject to change based on customer demand and the DISA STIG release schedule.

ASTi highly recommends that customers have an active support contract. Given that no two customers are alike, neither are their security requirements. The various components of this process are documented; however, there are always customers with specific questions in this area requiring some level of support. Support needs will vary from the area of installation or simply understanding why certain PDIs show the responses that they do in the SRR report.

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6.5. Security Package Installation

For the Target Security Package installation, reference the ACE Target Cold Start Procedure (DOC-02-TEL4-TCS-1) section 6.0 “Installing Telestra 4 Security Software Package” for step-by-step instructions.

For the Studio Security Package installation, reference the ACE Studio Cold Start Procedure (DOC-02-TEL4-ASCS-1) section 5.0 “Installing Telestra 4 Security Software Package” for step-by-step instructions.

In addition to installing the rpm package(s) during the ASTi Telestra 4 Security software installation, the DVD contains one folder labeled:

- `ASTi_SRR_Report`

The “ASTi_SRR_Report” directory contains a PDF that is provided to assist in the IA accreditation process. The PDF is generated from the non-ASTi generated DISA SRR results. ASTi transforms the raw results generated from the DISA SRRs into a user-friendly format. The first page shows a description of the Target platform under testing and includes information on the OS version, ACE Target software version, STIG/SRR version and Security Package version. In other words, it shows the configuration of the main aspects associated with generating an SRR Report. Additionally, there is a summary of any Open, Closed, Manual Review, False Positive and Waiver PDIs by vulnerability code. CAT I is the highest vulnerability code and CAT IV is the lowest. Pages 2 - N show the details of individual PDIs and are sorted by current status such as Open, Closed, etc.

Note: The RMS Status page does not display the OS software version when the optional security package is installed.

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Chapter 7: Warranty and Repairs

7.1. Warranty Information

The equipment is under warranty for a period of one (1) year following purchase. In the case of equipment upgrades, warranty applies to original date of shipment of individual components.

Other commercial equipment purchased or provided such as monitors, amplifiers, speakers, fiber optic links, etc. are also covered under the one year warranty unless otherwise stated.

The warranty does not cover improper equipment handling or improperly packaged returns. Extended warranties are available - contact ASTi for details (703) 471-2104.

7.2. Repairs and Returns

If it becomes necessary to return equipment to ASTi, please observe the following instructions:

1. Request an RMA number through the form on the ASTi web site: www://www.asti-usa.com/support/

   The receiving department at ASTi will not receive a repair without an RMA number.

2. When packaging the equipment in question, make sure it is well protected. ALWAYS DOUBLE BOX the equipment. The inner container should employ some semi-rigid, contour-fitting foam, while the exterior container should use a more pliant, shock-absorbing material such as styrofoam peanuts. The device should be properly enclosed in an antistatic bag to prevent possible ESD damage. Failure to properly package the equipment during shipping could void the warranty.

3. Do not send accessory pieces such as rack mount kits, power supplies or software. Only include items that do not work.

4. The shipping label must include the RMA number.

5. Include a description of the problem including the serial number for the unit in question. Include point of contact information including name, telephone number, and equipment return address. Failure to include this information could extensively delay the return of the equipment.

6. Evaluation of equipment is performed free of charge. No work will be done without prior customer approval.

7. Customer is responsible for shipping charges to ASTi for warranty and non-warranty repairs.

8. Note that if equipment is not under warranty, a purchase order will be required to cover any repairs. ASTi will provide a quote for all non-warranty items, including return shipping. Customer is responsible for return shipping charges on non-warranty equipment.

9. Equipment still under warranty will be shipped back via Federal Express, unless otherwise directed. ASTi is responsible for return shipping charges on domestic items under warranty.

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10. If equipment is not received by ASTi within thirty (30) days of the RMA number issuing date, the request data and number issued will be closed and designated as unused.
11. Any items received from customers without RMA numbers or appropriate contact information included with shipment will not be tested. After sixty (60) days, ASTi reserves the right to scrap all hardware received in this condition.
12. **International customers** must include the correct product value on all shipping documents. Contact ASTi for proper harmonized tariff codes. The customer is responsible for duties, taxes and fees incurred in shipment of the equipment.

7.3. Disclaimer and Warnings

There are NO user-serviceable components in this device. Opening the Telestra 4 Target chassis will void the warranty. ASTi does not support board-level repair, therefore fuses in the device are not user-replaceable.

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Appendix A: System Specifications

Temperature and Humidity Requirements

Target	Degrees Fahrenheit	Degrees Celsius	Humidity	Altitude
Operation Environment	50 – 90 F	10 – 32.2 C	20% – 95%	0 – 8,000 ft. (2,438 meters)
Storage Environment	32 – 135 F	-10 – 55 C	10% – 95%	0 – 8,000 ft. (2,438 meters)

Reliability

The ASTi sound system has been designed to use the minimal complexity of electronic hardware and the highest quality components. Special attention has been paid to the selection of traditionally less reliable elements such as the hard drive. To this end the Target contains a hard disk with a MTBF of 250,000 hours. Typical system MTBF will be greater than 50,000 hours (to be confirmed by field data). These numbers are based on predicted values with actual field data being superior.

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Appendix B: Software Version Release Notes

See Telestra 4 FAQs on the ASTi Web site (www.asti-usa.com/support/faq/telestra4.html).

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Appendix C: HLA RTIs Compatibility

ASTi is involved with an ever growing number of HLA-based communications simulations for a variety of programs throughout the US and internationally.

Important: From experience, each HLA program has its own set of unique issues and problems dependent on the equipment, software and simulation deployed. Therefore, ASTi cannot guarantee zero risk of any issues arising with the currently supported set of RTIs. Note that no set of tests are able to verify all aspects of operation. RTI operation, RID file settings, network operation and conditions, simulation software, and use of HLA in a network environment form a set of complex variables which must be tested together in their target environment under operational conditions.

ASTi's Telestra 4 HLA software supports the RTIs listed below. ASTi's Telestra 4 platform was tested with and supports several versions of the MÄK & VTC RTIs. The current HLA functionality is based on HLA 1.3 testing. Contact ASTi for IEEE 1516 support availability.

The user should choose the proper RTI based on the requirements (and GCC 3.4 compatibilities) of their operating system(s) or other HLA-related software. If there is an RTI that does not appear on this list but there is interest in it, contact ASTi to discuss the possibility of expanding the HLA software.

- VTC NG Pro 4.2.4 RHEL 4.0 OS, gcc 3.4.3 compiler
- VTC NG Pro 4.0.4 RHEL 4.0 OS, gcc 3.4.3 compiler
- VTC NG Pro 3.0.4 RHEL 4.0 OS, gcc 3.4.3 compiler
- VTC NG Pro 2.04 Linux FC3, gcc 3.4.2 compiler
- MÄK 3.2 Enterprise 4, gcc 3.4.3
- MÄK 3.1 Enterprise 4, gcc 3.4.2
- MÄK 3.0/3.0.1 Enterprise 4, gcc 3.4.4
- MÄK 2.4.2 Enterprise 4, gcc 3.4.3
- MÄK 2.4 Enterprise 4, gcc 3.4.3

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Appendix D: Useful Linux™ Commands

The following commands are useful when navigating the Target via the command line.

```
ls
```

Typing '`ls`' at the command line displays the files that are in a particular directory. It is similar to the '`dir`' command in DOS. Common variations include '`ls -l`,' which displays more information about the files and '`ls -a`,' which will display all files and directories including "hidden directories."

```
pwd
```

This command returns the full path that you are currently in. It is useful for seeing where you are in the directory tree.

```
cd_newdirectory
```

The Change Directory command allows the user to navigate through the file system. It is similar to '`cd`' in DOS but there are a few differences. For example, Linux is case sensitive. As a result the command:

```
cd Folder1
```

is not the same as

```
cd folder1
```

There is a shortcut to go up one folder which is the '`. .`' expression. Similarly, they can be combined to go up multiple folders in a single line. See example below:

```
[aceuser@localhost asti]$ pwd
/usr/local/asti
[aceuser@localhost asti]$ cd ..
[aceuser@localhost local]$ pwd
/usr/local
[aceuser@localhost local]$ cd asti
[aceuser@localhost asti]$ pwd
/usr/local/asti
[aceuser@localhost asti]$ cd ../..
[aceuser@localhost usr]$ pwd
/usr
[aceuser@localhost usr]$ ls
bin  etc  games  include  kerberos  lib  libexec  local  sbin  share  src
tmp  X11R6
[aceuser@localhost usr]$ cd x11r6
bash: cd: x11r6: No such file or directory
[aceuser@localhost usr]$ cd X11R6
[aceuser@localhost X11R6]$
```


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```
cp oldfile newfile
```

The copy command allows users to create and rename copies of any file in the file system. You must always specify both the file being copied and the new file name.See below for some examples.

```
mv oldfile newfile
```

The Move command works exactly like the ‘cp’ command, except that the original file is moved instead of copied and will no longer exist in the original location. This can also be used to rename files.

```
[root@CMKtarget TestSounds]# pwd
/var/local/asti/soundfiles/TestSounds
[root@CMKtarget TestSounds]# ls
ATIS_NAT.wav  EngineSurge.wav  Gear_Lock_Unlock.wav
[root@CMKtarget TestSounds]# cp EngineSurge.wav NewSoundName.wav
[root@CMKtarget TestSounds]# ls
ATIS_NAT.wav  EngineSurge.wav  Gear_Lock_Unlock.wav  NewSoundName.wav
[root@CMKtarget TestSounds]# cp EngineSurge.wav ../SoundGroup2/
NewSoundName.wav
[root@CMKtarget TestSounds]# ls
ATIS_NAT.wav  EngineSurge.wav  Gear_Lock_Unlock.wav  NewSoundName.wav
[root@CMKtarget TestSounds]# cd ../SoundGroup2
[root@CMKtarget SoundGroup2]# ls
NewSoundName.wav
[root@CMKtarget SoundGroup2]#


[root@CMKtarget TestSounds]# ls
ATIS_NAT.wav  EngineSurge.wav  Gear_Lock_Unlock.wav
[root@CMKtarget TestSounds]# mv EngineSurge.wav ../SoundGroup2/
[root@CMKtarget TestSounds]# ls
ATIS_NAT.wav  Gear_Lock_Unlock.wav
[root@CMKtarget TestSounds]# cd ../SoundGroup2/
[root@CMKtarget SoundGroup2]# ls
EngineSurge.wav
[root@CMKtarget SoundGroup2]# pwd
/var/local/asti/soundfiles/SoundGroup2
[root@CMKtarget SoundGroup2]# mv EngineSurge.wav ../TestSounds/
EngineSurge.wav
[root@CMKtarget SoundGroup2]# ls
[root@CMKtarget SoundGroup2]# cd ..
[root@CMKtarget soundfiles]# cd TestSounds/
[root@CMKtarget TestSounds]# ls
ATIS_NAT.wav  EngineSurge.wav  Gear_Lock_Unlock.wav
[root@CMKtarget TestSounds]# mv EngineSurge.wav JumpSound.wav
[root@CMKtarget TestSounds]# ls
ATIS_NAT.wav  Gear_Lock_Unlock.wav  JumpSound.wav
[root@CMKtarget TestSounds]#
```

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